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P2.4008 Characterization of a TE10-TM01 mode converter for microwave plasma interaction experiments.

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http://ocs.ciemat.es/EPS2019ABS/pdf/P2.4008.pdf
An experimental system SYMPLE (System for Microwave Plasma Experiments) is developed to investigate interaction of high power microwave (HPM) with an over-dense plasma (plasma > microwave) to address the physics of various linear and non-linear mechanisms related to wave absorption in plasma1. A washer-gun based pulsed (100 μs duration) plasma system1 has been developed for this purpose, having plasma density ne ~ 1x1018 m-3 and electron temperature ~ 10 eV. The HPM source is an S-band pulsed magnetron (3 GHz, 3.1 MW, 5 μs flat-top, TE10 mode), satisfying the condition ½ 0E2 /nekTe ~1 where E is the wave field, 0 is the free space permittivity, k is the Boltzmann constant and Te is electron temperature. The coupling between the HPM and Plasma is achieved with the help of WR 284 based coupling components. In order to have the wave launched to the experimental volume with E directed parallel to n(plasma density gradient), a TE10-TM01 mode converter is incorporated in the coupling scheme2. Prior to taking up experiments involving wave interaction with plasma, a low power (~ 20 dBm, 3 GHz) characterization of the TM01 mode output has been carried out first in free space, free of boundary effects, followed by experiments in the vacuum chamber which is a bounded media. The diagnostics used consist of a double ridge horn antenna, a D dot sensor and an isotropic electric field probe. The observed power and field distribution confirms effective TE10-TM01 mode conversion. A detailed account of the experiments and results will be presented in this paper.
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